Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

a280.39
Ag 8M
Mark. Bul. #24

A Portable Recirculation System

for Fumigating Bulk Products

in Freight Cars

LIBRARY
RECEIVED
JUL 23 1963
U.S. DEPARTMENT OF AGRICULTURE
BELTSVILLE BRANCH

Marketing Bulletin No. 24

U.S. DEPARTMENT OF AGRICULTURE
Agricultural Marketing Service
Market Quality Research Division

A PORTABLE RECIRCULATION SYSTEM FOR FUMIGATING BULK PRODUCTS IN FREIGHT CARS

Prepared by

Stored-Product Insects Branch
Agricultural Marketing Service

In fumigating freight cars of bulk products such as grains, rice, or cottonseed by the recirculation method, air is picked up by ducts at the floor level and discharged into the headspace. This pulls air down through the bulk commodity and distributes the fumigant through the mass of the product.

A method of accomplishing this with ducts laid on the car floor prior to loading is described in Bureau of Entomology and Plant Quarantine Publication E-838, June 1952, and in "The Value of Forced Circulation in the Fumigation of Bulk Commodities in Freight Cars," by Phillips and Latta, Down to Earth 8(4): 13-15, Spring 1953. However, in this arrangement, the car must be prepared for fumigation before it is loaded, and since the ducts cannot be retrieved until the car is unloaded, they must often be considered expendable.

This publication describes a portable system that can be installed in a loaded car and retrieved as soon as the fumigation is completed.

APPARATUS

This system is composed of 10 probes, a manifold fitted with 10 side ports, short lengths of connecting tubing, and a blower. Each probe is 6 feet long and 1-1/4 inches in diameter. One end is fitted with a pointed tip, which contains narrow slits large enough to permit entry of air but fine enough to screen out the product. The other end fits into a length of synthetic rubber tubing. Satisfactory probes have been made of drawn aluminum tubing. The tips were machine made and welded to the probe.

The manifold is divided into sections, with the entrance ports spaced equidistant along the length. Two types of manifolds have been used successfully. One was made of synthetic rubber tubing with tees inserted at 4-foot intervals to serve as entrance ports. The blower was attached to the center of the manifold with a tee. The tubing nearest the blower was 4 inches in diameter, and each section between side ports decreased in size to a diameter of 1-1/2 inches in the distal section (fig. 1).

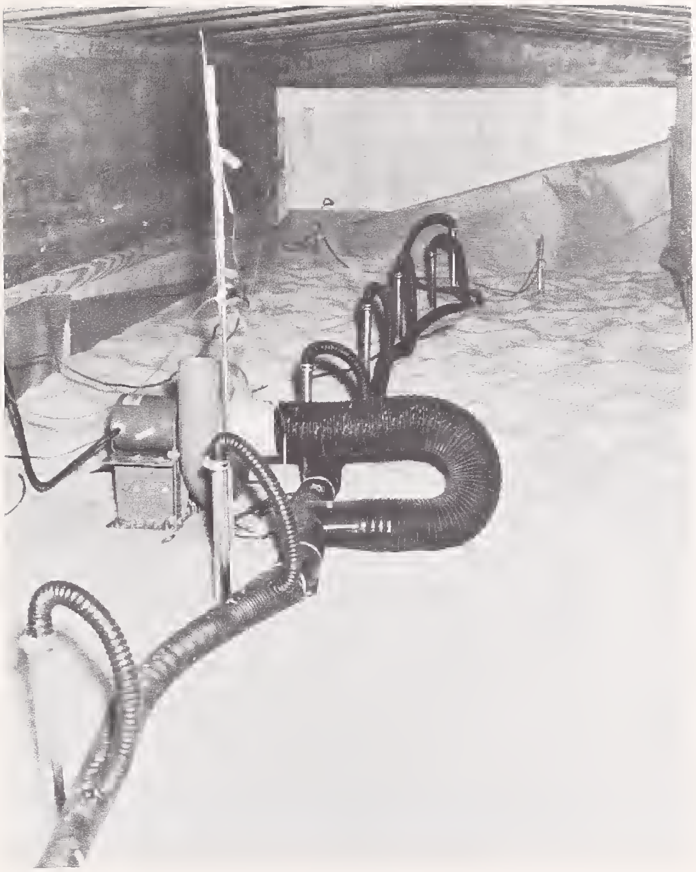
The second manifold was much simpler, being made of 4-inch metal downspouting, with standard tees with 1-1/4-inch side openings inserted at 4-foot intervals to serve as side ports, and a 4-inch tee connected to the blower.

One probe is connected to each side port on the manifold with a short length of synthetic rubber tubing. One end of each length is fitted with a quick-closing clamp to permit the rapid detachment of probes (fig. 2).

Washington, D. C.

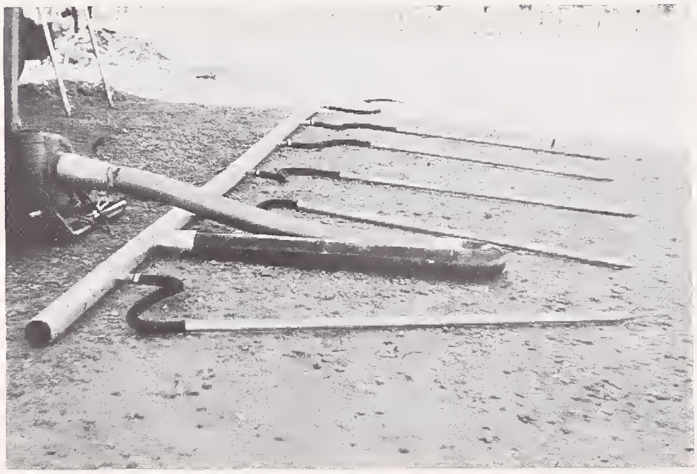
For sale by the Superintendent of Documents, Government Printing Office,
Washington 25, D. C.

May 1963



BN-3892

Figure 1.--Portable recirculation system with a flexible rubber manifold, in place in a carload of rice.



BN-18216

Figure 2.--Partly assembled portable recirculation system with manifold made of downspouting.

A blower with a capacity of approximately 150 cubic feet per minute at 8 inches of static pressure is necessary. A conventional squirrel-cage blower, powered by a 1/2-horsepower electric motor, was successfully used.

Most of the resistance in this system occurs at the point where the air is drawn into the slitted tips of the probes. The output of the blower under operating conditions should be measured, or the static pressure of the manifold and probes measured. If the output of the blower is measured, it should be sufficient to provide an airflow rate of at least 0.1 c.f.m./bushel (that is, 150 c.f.m./carload of 1,500 bushels of shelled corn or wheat). If the static pressure is measured, it should be within the range stated in the rating of the blower to provide the desired output indicated previously. If the measurement indicates too much resistance, either the slits should be enlarged or more slits added in the tips until the desired results are obtained.

INSTALLATION PROCEDURE

1. Level the top surface of the commodity. Insert the probes in a line down the center of the car, approximately equidistant from each other and the ends of the car. The tips of the probes should touch the floor. If headspace is limited, insert at an angle.

2. Lay out the manifold, one section to each end. Attach the probes to the manifold with the quick-coupling lengths of rubber tubing.

3. Connect the sections of manifold to the blower by means of the tee supplied for that purpose.

4. Locate the blower at a convenient spot on the top surface of the commodity. A small platform or a sheet of corrugated paperboard is useful.

5. Lead the electric line to an outside power source through the doorway, and close the door against the line.

6. Before the doors are sealed, place the fumigant introduction tube through the doorway, preferably next to the electric power line. Arrange the tube so that the fumigant will be released as a spray or a gas into the discharge of the blower.

7. Seal both doors with masking tape or a putty made of ground asbestos and water.

OPERATING PROCEDURE

Start the release of the fumigant and the operation of the blower simultaneously. Operate the blower for 15 to 30 minutes after all of the fumigant has been introduced. The rapidity of distribution will depend upon the efficiency of the recirculating system, but in most instances it will be accomplished in the period necessary for two or three air changes.

REMOVAL OF SYSTEM

The entire system can be removed as soon as the fumigation exposure period is completed and the car is aerated sufficiently to permit entry of an operator.

If the blower is to be reused on the other cars, it can be removed as soon as the distribution is accomplished. To do this, one door should be sealed with a paper grain door. As soon as the blower is stopped, an entrance can be cut in the paper, and the blower removed with very little loss of fumigant. The operator should wear a mask, or be protected by a flow of fresh air while removing the blower. The entrance port can be resealed with masking tape.

☆ U. S. GOVERNMENT PRINTING OFFICE : 1963 O - 688445